"Des Lumières dans la Nuit"

Successful Strategies Toward Restoration in Areas of Concern

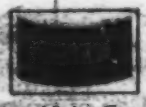
March 1998

Submitted to the Governments of the United States and Canada

Special Report

International Joint Commission

The **International Joint Commission** (IJC) was established through the 1909 Boundary Waters Treaty of the United States and Canada. The Treaty recognizes that each country may be affected by the other's actions in the lake and river systems along their common border; its purpose is to prevent and resolve disputes concerning these boundary waters. In 1972, the governments of the United States and Canada signed the **Great Lakes Water Quality Agreement**. This Agreement was superseded in 1978 by a new Agreement. Its purpose "is to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem." IJC is to assist in the implementation of the 1978 Agreement and assess the effectiveness of programs pursuant to it. The Agreement was amended by Protocol in 1987 to require, among other things, the development and implementation of Remedial Action Plans (RAPs) for the 42 designated Areas of Concern (AOCs). IJC was given the task of reviewing and commenting on the RAPs.



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Introduction

Purpose

This report examines current implementation efforts in various AOCs in the Great Lakes basin and identifies successful concepts, techniques and institutional characteristics. It is hoped that, in so doing, the most effective endeavours may serve as "beacons" to guide other AOCs where progress has been more difficult. Recent developments related to staffing and budget cuts are proving to be formidable impediments to efforts aimed at restoring beneficial uses in AOCs. Building on a decade of experience in reviewing RAPs and assisting in their development, IJC hopes to focus attention on the most productive methods of restoring beneficial uses in this era of limited resources.

Overview

In the 1987 Protocol to the Great Lakes Water Quality Agreement, the Governments of the United States and Canada agreed to develop and implement RAPs, in cooperation with state and provincial governments, in designated areas around the Great Lakes basin where beneficial uses were degraded and water quality objectives were not being met. RAPs are to embody a systematic and comprehensive ecosystem approach to the restoration and protection of beneficial uses. Since 1978, 43 AOCs have been identified and RAP development started in most of them with a view to restoring beneficial uses.

Under Annex 2 of the Agreement, IJC is required to review and comment on RAPs at three stages of development or implementation: when the problem definition has been completed; when remedial and regulatory measures have been selected; and when monitoring indicates that beneficial uses have been restored. A number of RAP documents have been reviewed over the past 15 years including 43 stage one and six stage two documents. One stage three RAP,

For More Information

For more information regarding IJC, you may contact IJC public information services at:

Canadian Section
100 Metcalfe St., 18th Floor
Ottawa, Ontario K1P 5M1
(613) 995-2984

United States Section
1250 23rd St. N.W., Suite 100
Washington, D.C. 20440
(202) 736-9000

Additional information regarding this report can be obtained by contacting the Great Lakes Regional Office:

In Canada -
100 Ouellette Ave., 8th Floor
Windsor, ON N9A 6T3
(519) 257-6734

In the U.S. -
P.O. Box 32869
Detroit, MI 48232
(313) 226-2170

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All photos © John and Ann Mahan except page 9 Bruce Kirschner and Gil Simmons, and page 13 Bay of Quinte Remedial Action Plan.

submitted regarding Collingwood Harbour, was reviewed and resulted in this AOC being "delisted" as all the required remedial programs were in place and beneficial uses essentially restored. In its review of RAPs, IJC emphasizes the proper designation of affected beneficial uses, the adequacy of data to assess causes and effects, the evaluation and selection of remedial measures, the understanding of the socio-economic context of decisions and the adequacy of public involvement.

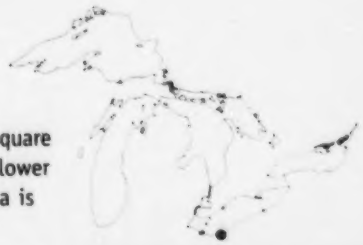
The preparation of RAPs has led to substantial planning efforts in some locations and often voluminous and time-consuming reports, perhaps to the detriment of actual remedial progress. Some jurisdictions have informed IJC that they no longer wish to prepare RAPs in the stages outlined. IJC responded by adopting a new initiative of conducting *Status Assessments*, designed to intensively examine the progress toward restoration of beneficial uses in selected AOCs or open lake waters. IJC wishes to emphasize the need for quality decisions and actual environmental results rather than the production of documents and other paperwork.

The Status Assessment process allows IJC to examine activities more intensively and pragmatically than in a review of a RAP document. It allows IJC to individually map the most productive route toward restoring beneficial uses and identify the specific roadblocks to progress. It also allows IJC to more directly analyze the adequacy of public consultation as well as actual commitments to restoration by all levels of government.

In addition to the review of RAP documents when submitted and the implementation of the Status Assessment process, IJC also has undertaken activities to transfer information among the various AOCs. For example, in July 1996, IJC in cooperation with The Johnson Foundation sponsored a conference entitled "Funding Strategies for Restoration of Areas of Concern in the Great Lakes Basin." This conference was designed specifically to facilitate the transfer of innovative funding strategies to AOCs throughout the Great Lakes basin. Presentations regarding these strategies were not restricted to concepts previously adopted in AOCs and included the use of green credit cards, environmental license plates and professional fund-raising techniques.

Area of Concern "Beacons" in the Great Lakes Basin

IJC is concerned that progress regarding complex and expensive remedial programs in a number of AOCs has been stalled as a result of the problems outlined later in the Obstacles' section of this report. These delays are largely for institutional and financial rather than technical reasons. There are AOCs where notable achievements have resulted in real progress toward the development and implementation of remedial actions. The following success stories are told to inspire and assist other AOCs to consider strategies and solutions that have worked elsewhere.



Black River: Strategic Planning

The Black River is located in north-central Ohio and drains approximately 467 square miles (1210 square km) before discharging into Lake Erie at Lorain, Ohio. The lower drainage area is primarily industrial and municipal while the upper drainage area is mainly agricultural.

In response to the land use pressures in the Black River watershed, the Black River RAP Coordinating Committee and its community partners resolved in January 1996 to restore, enhance and protect the Black River and its tributaries through a community based public-private initiative. The initiative relies heavily upon working with private landowners and land users to ensure protection of a privately held corridor along the Black River and its tributaries. This is considered to be the best way to combat non-point sources of pollution in the watershed. The Black River Stream Riparian Corridor Restoration Task Force was officially authorized by the Black River RAP Coordinating Committee in August 1995. Its assignment was to identify strategies that members of the Black River RAP could realistically implement to combat non-point source pollution. By May 1996, an aggressive and comprehensive riparian corridor implementation plan was developed as part of this resolution and became the basis of the Black River RAP long range plan.

In the Fall of 1996, the Committee endorsed the formation of a full watershed management plan to address the land use effects and beneficial use impairments

Lorain Harbor Lighthouse

of both point and non-point sources of pollution. This long range plan is an effort by the Committee to begin formulating its stage two report. The stage two report, which will include the long range plan and subsequent annual work plans, is intended to address the environmental health problems and beneficial use impairments of the Black River watershed.

The long range plan provides direction for the Committee to address the major land uses that are impacting the Black River watershed and was created through a series of meetings ranging from a large facilitated retreat held in October 1996 to smaller brainstorming sessions and one-on-one conversations. As a result, the long range plan not only reflects the needs of the Black River RAP, but takes account of the external land use patterns that impact the protection, restoration and enhancement of the watershed. The RAP Committee adopted the plan in March 1997. It identifies watershed management goals and objectives including specific implementation activities of the Black River RAP. The objectives are outlined in box below.

Black River RAP
Long Range Plan Objectives

Planning
- County and Regional Planning
- Demonstration Projects
- Land Conservation
- Water Quality Monitoring and Evaluation

Watershed Management
- Best Management Practices
- Stormwater Management Practices
- Source Reduction
- Sewage Management

Education
- Education and Community Awareness
- Water Quality and Habitat Enhancement

The Black River RAP Coordinating Committee will address the various objectives by selecting activities for implementation through the formation of annual work plans. Progress will be documented in annual reports to the Black River watershed community.

The overall intent of the long range plan is to: 1) provide an ongoing focus for RAP activities, and 2) attract funding and resources for its objectives. It will be used to accelerate or surpass existing program agendas in order to address the land use pollution and beneficial use impacts to the watershed. Effects of this plan's creation already are being felt.

- The Great Lakes Watershed Initiative Project, with support of The Conservation Fund and the Council of Great Lakes Governors, was launched in the Black River watershed in the Summer of 1996. The Conservation Fund received a grant from The George Gund Foundation in February 1997 to support this effort. This project is promoting development design standards that can significantly reduce non-point source pollution and watershed impacts and will target initiatives for working with developers.

- The Black River Watershed Education Project, a 10-month pilot project that provides watershed-based environmental education programs for Lorain County schools, was launched in September 1996.

- Seventh Generation, a local non-profit organization, received a grant in March 1997 through the Great Lakes Commission to provide a cost study of stormwater erosion control best management practices for residential and commercial/industrial construction sites.

- Seventh Generation, in March 1997, received a grant from the Lake Erie Protection Fund to provide demonstration bioengineering stream bank stabilization efforts for private landowners in a selected target area in the watershed.

Properly managing urban, suburban and rural land uses along the Black River and its streams will improve the quality and productivity of the Black River watershed. The long range plan is intended to guide the Black River RAP Coordinating Committee in supporting farmers, developers, business owners, residents, government officials, private citizens and others in meeting this challenge. The Black River RAP long range strategic planning process, which includes the development, implementation and assessment of the long range plan and annual plans, is not a single, static event. Rather, it is a continuous process that must adapt to environmental changes and impacts in the Black River watershed. The Committee will continue to evaluate the planning process through its meetings, project teams and outreach efforts as part of its commitment to the Black River watershed community.

Lessons Learned

- The need for an integrative partnership institution that mobilizes all community interests toward shared remedial goals.
- The value of a long range plan that can define and direct a coordinated multi-year program among all parties and establish priorities and mile-posts for progress, as well as provide a basis for generating funding.
- The value of shorter term, interim goals and events to mark specific achievements.

Grand Calumet River/Indiana Harbor Ship Canal: Public-Private Partnership

This AOC is located in Indiana about 15 miles (24 km) southeast of Chicago, Illinois. It is highly industrialized and consists of the Grand Calumet River, the Indiana Harbor Canal and the near shore of Lake Michigan.

The state and federal environmental enforcement initiative in northwest Indiana has been successful in bringing the regulated community into compliance with environmental regulations and will result in remediation of five of the 20 miles (eight of 32 km) of contaminated sediment in the Grand Calumet River. However, given the magnitude of contaminated sediment, a successful cleanup will not occur through enforcement actions alone.

A partnership plan proposing a community-based, consensus driven, cooperative approach to cleaning up and restoring the Grand Calumet River was presented to the Citizens' Advisory for Remediation of the Environment (CARE) Committee by the Indiana Department of Environmental Management in September 1995. Under the plan, the proposed Grand Calumet Area Partnership would coordinate the numerous ongoing efforts to clean and revitalize the environment of northwest Indiana. Coordination would ensure that limited funds are used efficiently and that cleanup and restoration projects do not recontaminate downstream areas.

The objective is to enable industry, municipalities, citizen groups and state and federal agencies to work cooperatively with pooled resources. CARE would enable each of the parties involved to contribute to the restoration of the AOC. Contributions could be in the form of funds or resources for administering, designing, dredging and sampling or in the form of land for disposal and habitat restoration.

In April 1996, the state of Indiana and the Grand Calumet Task Force held a joint meeting to discuss the partnership approach with local business. This meeting emphasized the benefits of participation in a cooperative effort. A series of meetings with individual businesses and groups of businesses followed to determine potential liability, to relate benefits of the partnership, to determine the resources available and to uncover possible impediments to participation by some businesses. Meetings are presently underway to establish the partnership, receive commitments and set milestones for action.

The Indiana Department of Environmental Management has also entered into two contracts with the U.S. Army Corps of Engineers to develop a plan for sediment cleanup and restoration options.

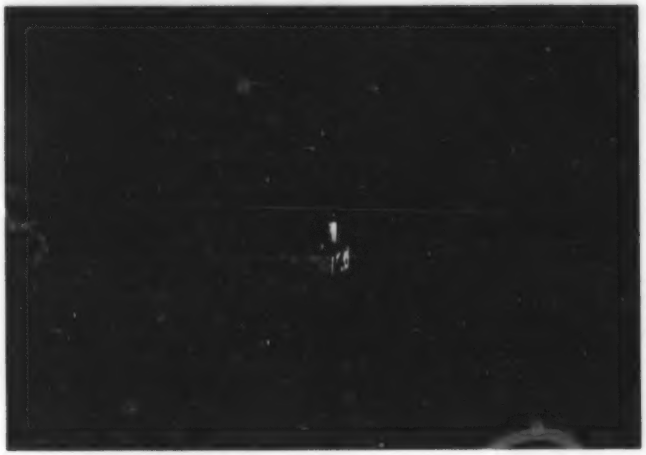
The plan will determine total volume of contaminated sediment, appropriate cleanup methods, implementation sequence and disposal options. It also will be used as a basis for partnership-based and enforcement-based cleanup activities.

The Grand Calumet cooperative project moves beyond a traditional regulatory approach and teams the U.S. EPA and the Indiana Department of Environmental Management with the local industries in a voluntary cooperative effort. These companies have agreed to undertake actions to ensure that free-phase hydrocarbons on their properties are not released to surrounding waterways.

Indiana Harbor Ship Canal

Lessons Learned

- Pooling of financial and other resources through cooperative efforts may assist in developing and implementing effective remedial strategies.
- Measures other than regulatory enforcement are required, based on public-private sector partnerships.



Calumet Harbor Lighthouse

Hamilton Harbour: Working Toward Sustainable Development

Hamilton Harbour, situated at the western tip of Lake Ontario, has a surface area of 215 hectares (0.83 square miles). With the exception of the Burlington Ship Canal, it is separated from Lake Ontario by a sandbar.

In 1989, a sustainable community initiative was begun as a philosophical basis and framework to consider several items: the Hamilton-Wentworth regional government's policy goals and objectives; the region's official plan and economic strategy; budget decisions; and other initiatives including the implementation of the Hamilton Harbour Remedial Action Plan. Over a period of two and one half years, a citizens' Task Force on Sustainable Development met with more than 1,000 citizens and developed a consensus of the community vision, then produced the document *Vision 2020: The Sustainable Region*. *Vision 2020* describes the type of community that Hamilton-Wentworth could be in the year 2020 using principles of sustainable development as a guide for decision making. Follow up documents, *Directions for Creating a Sustainable Region* and *Detailed Strategies and Actions for Creating a Sustainable Region* identified more than 400 recommendations for effecting policy shifts to make this vision a reality.

The Hamilton-Wentworth regional government incorporated these recommendations into a new official plan for land-use entitled *Towards a Sustainable Region* that incorporates almost 100 of the detailed recommendations. In November 1994, the *Renaissance Report* was adopted by Hamilton-Wentworth regional council as its strategic plan for long term economic development. A transportation review and a comprehensive municipal pollution prevention plan also have been developed with the goals of the vision statement in mind.

The Hamilton-Wentworth regional council now requires that all new proposals and projects be assessed for sustainable community implications and a sustainable community decision making guide is used as a tool to evaluate all proposed and existing policies, programs and projects. The region hosts an annual *Vision 2020* Sustainable Community Day at which the progress of the region relative to the goals of *Vision 2020* is presented in the form of a report card.

The incorporation of the recommendations of *Vision 2020* into the long range plans for the region of Hamilton-Wentworth shows a level of commitment to the goals of sustainable development that is recognized both at the national and at the international level. Hamilton-Wentworth has been selected as one of 14 communities worldwide by the International Council for Environmental

Initiatives' Local Agenda 21 Model Communities Programme. The Programme is a research and development project in which the 14 municipalities design, test and evaluate planning frameworks for sustainable development. In 1994, the Hamilton-Wentworth region received the 1994 Canadian Environmental Achievement Award in the local government category.

The region's vision of the future is radically different from its past with the local economy once dominated by the steel industry. As this industry downsized, the community began to discover high-tech companies and small businesses as the new driving force for its economy. For example, one city of Hamilton task force has a goal of creating a centre of environmental excellence with a plan to focus on new areas of global economic growth. This approach relies, among other things, on the premise that a healthy environment is needed to attract the small businesses and high-tech companies that will form the basis of the region's growth potential in the near future.

1858 Lighthouse at Ship Canal, Hamilton

Lessons Learned

- A vision and plan based on a community philosophy of sustainable development can successfully form the basis fo a shared understanding of how to develop sustainability and remedy past practices.
- The coordinated and determined involvement of local government is a strong factor in developing the community will.
- A creative vision of a region's future may require a different economic base than the present one.

Cootes Paradise Scene, Hamilton

Ashtabula River: Effective Use of a Partnership

The Ashtabula River flows into the central basin of Lake Erie at the city of Ashtabula, Ohio. The lower part of the river and its outer harbor serve the community as both a commercial and recreational harbor. Fields Brook, a major tributary, is designated as a U.S. Superfund site. Superfund is a legal designation given to heavily contaminated areas because the release of chemical pollutants from the site pose a potential or actual threat to human health. Site cleanup is still underway, with millions of dollars having been spent over the last 14 years in litigation between U.S. EPA and the companies and individuals potentially responsible for the contamination.

In 1993, U.S. EPA determined that movement of sediment from Fields Brook contaminated sediments in the Ashtabula River and its outer harbor. Based upon this determination, U.S. EPA announced plans to designate the river and outer harbor as part of the Fields Brook Superfund site. Coupled with this announcement, the U.S. Army Corps of Engineers determined that it was no longer able to maintain the navigational channels due to PCB contamination that precluded open lake disposal of dredged sediment. With this determination, the Corps proposed to build a confined disposal facility at a cost of $12 million (U.S.) for disposal of the sediment. With this cost added to the estimated total AOC cleanup costs of $30 to $50 million, the Ashtabula community faced the crisis of not being able to find resources to fund its share in the project, while facing closure of its commercial and recreational harbor due to lack of dredging. The proposed solutions imposed too great a financial burden on the community, necessitating the development of new solutions.

During this time, the Ohio Environmental Protection Agency was attempting to energize the Ashtabula River RAP process. A group of government agencies involved in the RAP process developed a remedial plan and presented it to the community in January 1994. The plan called for the development of a cooperative, local voluntary effort by which to clean up the river. This approach gathered unanimous acceptance resulting in the formation of the Ashtabula River Partnership. A Partnership Charter was signed in July 1994 by the involved agencies, the industrial potentially responsible parties and involved elected leaders. The Partnership recognized the links between the interests of U.S. EPA and the Corps of Engineers — commercial and recreational navigation interests and complete remediation of the river.

The Partnership drew from the experience of northwest Indiana and the Grand Calumet River/ Indiana Harbor Ship Canal AOC, which had recently faced a similar task and proposed building a

Lake freightor reaching safe harbor at Ashtabula, Ohio during a Lake Erie storm

multi-party, multi-purpose disposal facility. At Ashtabula there were three existing planned projects, each requiring a disposal facility to contain dredged sediment. The Partnership has been able to identify common elements in the projects in order to coordinate one project instead of three. The Partnership, again following the Indiana example, formed an independent, non-profit foundation to undertake the task of AOC remediation. U.S. EPA has withheld designating the Ashtabula River and harbor as part of the existing Superfund site in order to allow for the demonstrating of progress through this partnership approach.

A key element in the approach was obtaining tax-exempt status under Section 501 (c) (3) of the Federal Tax Code. The Ashtabula River Foundation was granted this status in November 1996 and is dedicated exclusively to charitable, educational and scientific activities that lead to the restoration of beneficial uses of the Ashtabula River. The Foundation can accept gifts, bequests and contributions, either outright, in trust or in any other form and can use, apply, invest and reinvest the principal or generated income to advance remediation. Its immediate objective is to support the dredging of the Ashtabula River and harbor. Once this is accomplished, it will support further restoration of all 47 miles (76 km) of the Ashtabula River.

Numerous commitments have already been made for funding the costs of sediment removal and disposal. They include seven million dollars from the state of Ohio along with a commitment by the Corps of Engineers to match funding for dredging sediment that affects navigational interests. It is hoped that funds from the private sector will result in additional matching of federal dollars. In addition, there are current plans to float a tax exempt environmental bond. This approach is now being looked upon by various implementing agencies as a new model for community-based environmental protection.

Lessons Learned

- Costly remedial programs may be too expensive for local communities, but can be achieved by concerted community action, partnerships and innovative thinking.
- The use of tax exempt status and matching grant provisions are possible means of innovative financing of remedial programs.
- Restoration efforts benefit from the active involvement of elected officials.
- Sharing and utilizing successful strategies from other AOCs is important.

Bay of Quinte: Phosphorus Trading

The Bay of Quinte is located on the north shore of Lake Ontario and is virtually isolated from the lake by Prince Edward County. Four major rivers flow into the upper bay: the Trent, Moira, Salmon and Napanee.

Eutrophication with its undesirable high levels of algae due to continued high phosphorus loads is a major water pollution problem in the Bay of Quinte. There are many phosphorus sources, including point source discharge from municipal sewage treatment plants and industrial sites, as well as non-point sources of pollution, such as agricultural runoff, urban stormwater runoff and failing septic systems.

Various abatement actions have been introduced, including sewage treatment and industrial upgrades. While these actions are important, they are often an expensive solution. A 1995 study estimated costs of $10 to $4,500 (Cdn) per kilogram (1 kg = 2.2 lbs.) of phosphorus removed for sewage treatment plant upgrades needed to meet phosphorus targets. Industrial upgrades are also expensive ranging from $518 to $2,300 per kilogram removed. Costs to control non-point sources are often significantly less. Measures taken on agricultural land, such as conservation tillage and retirement of erodible lands, cost between $30 and $60 per kilogram of phosphorus prevented from running off into waterways. Milkhouse waste and barnlot runoff controls range from $60 to $100 per kilogram, fencing livestock out of waterways ranges from $300 to $400 per kilogram and septic system repair costs are more than $1,000 per kilogram. An opportunity exists for point source and non-point source dischargers to work together to implement cost-effective pollution control measures and achieve phosphorus targets.

One practical, environmentally-sustainable and innovative option is a phosphorus permit trading program. In simple terms, a trading program establishes the total amount of phosphorus permitted to enter the bay from all input sources, assigns a percentage of the total amount to each source, and allows the sources of phosphorus to buy and sell these allocations among themselves as long as the total permitted amount is not exceeded. Within the Bay of Quinte watershed, there are three possible types of trades:

1) trades between point source dischargers;
2) trades between point and non-point sources; and
3) trades between non-point dischargers.

Belleville Light, Bay of Quinte, Ontario

In its 1997 feasibility study of phosphorus trading, the Bay of Quinte RAP developed a number of economic models to evaluate trading between point and non-point sources as a mechanism to meet the RAP targets. Without trades, the cost to implement point source controls would be $2.1 million annually to remove 12 more tonnes (13.2 tons) of phosphorus from the effluent stream each year. Trading to achieve the same targets cost $0.5 million annually and removed 16 tonnes (17.6 tons). Thus, trading would save $1.6 million annually over traditional pollution control and reduce phosphorus inputs to the Bay of Quinte by four more tonnes (4.4 tons) per year.

The study examined three trading systems: 1) open market; 2) trading by auction; and 3) trading in an administered market. Open market trading has no administrative controls, rather, it allows parties to trade and negotiate costs directly with each other. Trading by auction, as its name suggests, sells permits to the highest bidder. An administered market includes a trading association to manage trades and set prices, overhead costs for program administration, additional rules, and possibly, membership fees. Each trading system has its merits, although an administered market may be preferred in any initial implementation work to target smaller areas within the watershed and assess the full impact of trades.

The study also reported that optimal trading would occur if point source abatement costs are greater than $100 per kilogram of phosphorus removed, while the selling cost for implementing non-point source remedial measures is less than $50 per kilogram. In an administered market, the study concludes that $50 would be a reasonable base price for seeking trades.

Several outstanding issues require clarification prior to implementing a phosphorus trading program. Issues include uncertainties regarding the quantity and diversity of non-point source inputs, projected population growth, the role of regulatory controls, adjustments for seasonal impacts and the rules and mechanisms for renewing trades.

Reductions from point sources are determined with relative certainty by end-of-pipe monitoring while non-point source discharges are difficult to measure and interpret. To account for the uncertainty and provide greater environmental protection, a trading ratio can be used. Using a 2:1 ratio, a point source discharger would have to acquire two kilograms from a non-point source for every kilogram of phosphorus discharged from the point source. Modelling analysis suggest that a

ratio between 2:1 and 4:1 non-point to point source would guard environmental quality and maintain economic feasibility. As the trading ratio increases (e.g., 8:1 or 10:1), the economic rewards diminish and trading, as a result, decreases.

Future scenarios for population growth were modelled. With expanding urban populations, phosphorus loads from point sources will increase. In one scenario, point source phosphorus inputs rose to nine more tonnes (9.9 tons) by the year 2016 over 1995 levels. If trading were employed, pollution controls would cost $1 million — this is $1.1 million less than the "no trade" scenario before population growth.

In summary, permit trading, in certain situations, is an imaginative solution for achieving and sustaining water quality improvements. In the Bay of Quinte, trading may, as the modelling suggests, provide another tool to effectively link point and non-point source cleanup actions, address water pollution problems in parts of the Bay of Quinte watershed and create new economic opportunities for urban and rural areas.

Information Sources

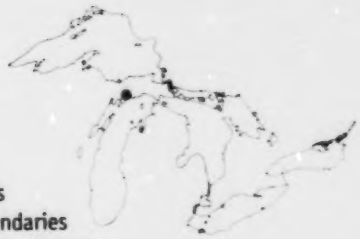
1. Phosphorus Trading Program - Evaluation and Design (Final Report) - Bay of Quinte Remedial Action Plan. Draper and Associates. March 1997.

2. Concern for the Future (Public Report #2 on the Cleanup of the Bay of Quinte). Bay of Quinte Remedial Action Plan Implementation Advisory Committee. 1996.

Lesson Learned

- Pollutant release trading among sources, when allowable target loads can be defined, may be an effective way to achieve RAP targets in the most cost-efficient way.

Manistique River: Superfund Remediation



The Manistique River/Harbor AOC lies on the south shore of Lake Michigan's Upper Peninsula. Three areas of contaminated sediment fall within the boundaries of the city of Manistique, with PCB concentrations that far exceed U.S. EPA's 10 part per million (ppm) cleanup level. The most highly contaminated site has a PCB concentration measured at 2,510 ppm. Surface water analysis indicates that about 100 pounds of PCBs are washed annually into Lake Michigan. The potentially responsible parties include a paper company, electric utility, local salvage yard and companies that previously sent materials to the salvage yard.

The U.S. EPA remedial recommendation for this area was to dredge contaminated sediment and to dispose of it at a suitable landfill, however the potentially responsible parties identified capping as a potential less costly alternative to dredging and disposal. After considering both alternatives, U.S. EPA concluded that approximately 120,000 cubic yards (92,000 cubic meters) of sediment and waste material would be dredged from the river and harbor and transported for off-site disposal. As a result, the potentially responsible parties agreed to pay U.S. EPA the cost equivalent of capping contaminated areas in the harbor rather than the cost of dredging and disposal and, in exchange, U.S. EPA agreed to absolve the parties of any future liability associated with this site. The total estimated cost of the project is $16 million (U.S.).

Highlights of this remediation success story include the cooperation achieved between industry, government and the public, participation by U.S. Representative Bart Stupak and a timely remediation period that is expected to be three to four years shorter than the typical clean-up effort.

Lessons Learned

- Timely cooperation of the private and public sectors including participation at the political level can result in faster implementation and results.
- Cooperative flexibility that uses government funding to "top-up" the costs borne by the potentially responsible parties can achieve socially-preferred solutions.

Manistique Lighthouse

Muskegon and White Lakes: Creative Fund Raising

The Muskegon Lake AOC is located on the east shore of Lake Michigan. Water and habitat quality in Muskegon Lake and its tributaries have been degraded by discharges of industrial process wastewater, municipal wastewater, combined sewer overflows, urban runoff and filling of the lake and wetlands. The White Lake AOC is located approximately 15 miles (24 km) north of Muskegon Lake and is administered together with the Muskegon AOC.

The Muskegon Lake Public Advisory Council (PAC) was established in 1992 through a grant from the Lake Michigan Federation. Since the PAC's inception, members have used creative methods to fund and support their activities. The group meets monthly wherever free meeting space is available and relies on the Muskegon Conservation District to provide administrative support. The PAC has successfully involved a broad range of stakeholders in the RAP process. The diversity of persons and groups involved has contributed to expertise available to the projects in Muskegon.

The PAC is now on its third grant from the Michigan Department of Environmental Quality. Michigan has provided funding to maintain the PAC and support public education efforts, however, each grant has been successively smaller. The start-up funds have raised public awareness and opened the door to the present monetary support received from the community. The PAC has been industriously writing grant applications to obtain additional funds. The goal is not to raise funds for operation of the PAC itself, but to direct funds to appropriate implementation activities. Kathy Evans, of the Muskegon Conservation District states: "Many successes have been achieved in securing funding for small projects such a beach cleanups and storm drain stenciling programs. But, the much larger and more expensive projects, such as sediment remediation, still lack funding." The PAC is now looking to grants from U.S. EPA and other sources to support these activities. It is currently taking advantage of a program funded by U.S. EPA and provided by the nonprofit organization Clean Sites to support Michigan PACs for strategic planning and conflict resolution.

Public involvement and community awareness have fostered the formation of many partnerships. The LakeWatch program trains volunteers to monitor water quality in Muskegon and White lakes. The samples gathered are analyzed through a partnership with NOAA's Great Lakes Environmental Research Laboratory. Other partners in this project are: Muskegon Conservation District, Muskegon Sportfishing Association, White Lake Area Sportfishing Association, White Lake Rotary and the Timber Land Resource Development and Conservation Council, which is supported by a Phillips Environmental Partnership grant.

White River Light Station

Muskegon South Pier Light and Coast Guard Station

Muskegon Conservation District provides coordination, materials and training for the Adopt-a-Stream Program. Volunteer teams become caretakers on a stretch of stream or lake shoreline. These groups perform a range of tasks including cleanups, water quality tests, wildlife surveys and storm drain stenciling. Tasks are tailored to the schedules, interests and expertise of the group. For example, Orchard View High School biology students monitor a stretch of Four Mile Creek. The students perform water quality tests and study benthic organisms to monitor water quality. PAC members monitor amphibians in several areas around Muskegon and White Lakes. Scout and church groups have stenciled storm drains and cleaned trash from shorelines.

The city of Muskegon is presently revising its master plan. The PAC and local conservation groups have encouraged the inclusion of a natural features inventory section. A 1995 habitat assessment provided a solid framework on which to build this section. Inclusion in the master plan is the first of a series of stages to build political will to protect natural areas and restore degraded habitat.

The PAC has chosen to support projects that will be visible in the community, such as habitat rehabilitation. It feels this is necessary to maintain the momentum of the RAP. Less visible projects, such as sediment remediation and dealing with groundwater contamination are more expensive, and these large cleanup projects cost more than the community can afford. While the community is doing its part to raise funds and form partnerships to sustain the RAP, more complex and costly environmental problems remain unresolved. Listed below are recently awarded grants for the Muskegon Lake or White Lake AOCs. While receipt of these grants allows the continuation of useful and visible activities, the effort necessary to prepare appropriate grant applications represents a significant portion of volunteer time.

Lessons Learned

- Efforts by local volunteers to obtain funding, additional volunteer participation in projects and build on other local initiatives such as municipal planning can pay off.
- Large projects require effort to build visibility and increase citizen interest. Small, citizen-accessible projects are easier to fund and complete than large ones.

1996 Grants Received for Muskegon or White Lake

ACTIVITY	DOLLARS (U.S.)
RAP Implementation/PAC Support	47,000
Muskegon Lake RAP Activities	5,000
White Lake RAP Activities	5,000
Montague Drain Project	15,000
Muskegon County land Use	4,500
White Lake Benthic Study-interagency	140,000
Green Belts	20,000

White River Light Station

Muskegon South Pier Light and Coast Guard Station

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Major Obstacles to RAP Implementation and Common Problems

Major Obstacles to Implementation

The seven examples provided showcase successful concepts, techniques and institutional characteristics that have furthered action toward remediation and have created community momentum in their Areas of Concern. The examples also illustrate the importance of examining different strategies that work and apply them in other AOCs. During the past several years of reviewing RAPs and assisting in their planning, IJC has found several common reasons as to why remedial programs in a number of AOCs have been stalled.

1. Lack of Planning for Implementation of "Big Ticket" Remedial Measures

In many AOCs, planning for implementation has not included the steps needed to quantify the cost of potential remedial options nor identify possible methods of financing "big ticket" remedial measures. These measures, often for the treatment or removal of contaminated sediment or sewerage infrastructure improvements, can cost millions and sometimes billions of dollars. There are several shortcomings to this major flaw in planning.

- It fails to inform the public about the magnitude of the environmental problems and associated financial needs.
- It prevents proper evaluation of alternatives so as to obtain the maximum environmental net benefit.
- It precludes the necessary capacity building within the community for obtaining achievable solutions in a timely manner.
- It fails to address the benefits of remediation.
- It increases reliance on large scale government programs, such as Superfund, for contaminated sediment problems, and outside funding sources, such as Ducks Unlimited for habitat projects.

This last shortcoming can result in special challenges for funding comprehensive remediation in AOCs with contaminated sediment located outside targeted contaminated sites. In addition, some

jurisdictions have initiated habitat enhancement projects in AOCs before the removal or treatment of contaminated sediment, which occurred in the Hamilton Harbour AOC. This practice can result in greater fish or wildlife utilization of a contaminated habitat. In AOCs, such as the Detroit River, lack of planning for sediment remediation has meant that no government financed remediation of sediment has occurred. Thus, it has been estimated that the cleanup of contaminated sediment in the Detroit River AOC could take at least 40 years.

2. Reductions in Government Support with No Associated Increase in Local Capacity

Reductions in government funding and staffing for AOC restoration activities are almost universal throughout the Great Lakes basin. Many cutbacks have occurred with little notice and no publicity. This manner of downloading expensive and complex activities on communities has resulted in considerable frustration at the local level and a resultant decline in activity in many affected AOCs. The failure to build the local capacity to assume tasks related to remediation prior to the cutbacks has led to a "sink or swim" challenge, especially for the more marginal RAP efforts. Some public advisory committees struggle to cover day-to-day expenses while others aggressively seek donations and grants.

The status of some efforts remains unclear. For example, the province of Ontario proposed utilizing a natural regeneration stage to restore certain areas of contaminated sediment once source controls had been initiated. At one time, representatives of Ontario public advisory committees considered possibly redesignating these AOCs as Areas of Recovery or Areas of Restoration. However, in September 1997, they unanimously passed a resolution stating that AOCs should not be renamed or redesignated until after all beneficial uses have been restored. Lack of funding appears to be the driving force behind suggested changes of this nature.

Attempted downloading of financial and organizational responsibilities appears to contribute to citizen frustration regarding the lack of progress in some AOCs. Citizens in some AOCs note that they have devoted years to working with government agencies toward the goal of remediation only to be informed recently that cleanup efforts are regarded as purely local problems. Having bought into what they perceived to be a government process, they were informed that they own the process and problem, even though the local community cannot afford to address them on its own. Except for a very few instances, most planning efforts for restoration of AOCs appear to have overlooked two of

the most elementary questions regarding water resources planning: what are the various alternatives for possible implementation and what are the costs and benefits of each alternative?

Funding for restoration of AOCs has received limited attention as a principal concern for implementing agencies in the Great Lakes basin. Far too little effort has gone into determining the highest priority remedial activities and pursuing necessary funding to finance their implementation. Necessary funding for optimal remediation appears to be increasing, perhaps due to better quantification of costs. An increasing number of remedial activities have yet to be funded and implementation budgets are under continued pressure as available funding appears to be shrinking.

Lack of continuity in staffing for AOCs is a common problem related to funding cutbacks. It has been difficult to locate and contact the appropriate agency staff member in regard to some AOCs. Changes in responsible persons are often not well publicized and some AOCs have contact persons located in distant locations.

Sizable reductions in the government spending and staffing have occurred with no corresponding increases in funding and staffing from other sources. AOCs that have seen some increases in grant funding or partnership arrangements appear to have extraordinary local leadership or are recipient of short term funding designed not for implementation activities but for staff support. Technical support is often being supplied from distant locations with little "hands-on" expertise being made available to public advisory committees and local jurisdictions. **Information gathered so far in IJC's Status Assessments clearly shows the strong desirability of stable, locally-based agency support.**

3. Failure to Set Priorities Within and Between AOCs

Prioritization between individual remedial options and between AOCs appears to be *ad hoc*. The activity lacks transparency. It also appears that binational AOCs are not assigned any higher priority for resources than other AOCs. Many binational AOCs have extensive industrial areas and the added challenges of working across an international border as well as the problem of transboundary pollution and a more direct impact immediately downstream. To give an example of what can be done: the state of Illinois has developed transparent prioritization processes to produce greater impact on human health issues and ecosystem protection. Therefore, the Illinois Environmental Protection Agency developed a framework to direct available resources to watersheds where the greatest environmental benefit can be realized. This framework has been

developed into a report format and is available via the Internet. While this effort is a statewide program, the approach taken by Illinois is both reasonable and commendable and similar criteria could be developed by jurisdictions to target actions within and between AOCs.

The current level of financial and staffing commitment in most AOCs is not sufficient to adequately address existing environmental problems. In some AOCs, environmental problems are still not well quantified. Consequently, total costs for remediation have not been determined. The current level of government support to AOC restoration is not expected to increase and in fact may decrease in the future. Accordingly, greater need for prioritization both within and between AOCs is crucial. Few AOCs have set priorities between competing environmental problems. Effort is often devoted to problems that appear to be the readily funded rather than the problems that result in the greatest environmental harm. Recent information regarding human health effects (Johnson *et al.* 1997, Lonky *et al.* 1996) confirms the need to fully address the problem of persistent toxic substances as a high priority.

4. Public Participation

In an era of many competing messages, intensive and perhaps expensive media campaigns are needed to reach and inform audiences of even popular themes, such as environmental restoration efforts. Little effort has been devoted toward the use of mass media, particularly in the more urbanized AOCs. Many of these areas have substantial resources and talent in the fields of television and radio. The use of public service announcements, broadcast at no-cost, presents a useful opportunity to reach segments of the population difficult to access.

5. Information Transfer

The transfer of information and technology between AOCs appears to be random and infrequent. Considerable new information, associated particularly with human health effects and sediment remediation, is available but apparently is not distributed to the AOC communities in any systematic fashion. Innovative use of existing information technology has the potential to assist in providing rapid transfer of information and technology to AOC teams that are seeking such assistance. U.S. EPA's web site provides resources for nonprofit organizations and is a notable example of the type of product that can be provided. This web site provides easy access to environmental and health information. Its address is http://www.epa.gov/epahome/nonprof.htm(.)

6. Failure to Quantify Benefits of Remediation Particularly Regarding Human Health

Information regarding the benefits derived from remedial activities is not widely distributed to AOCs throughout the basin. Environment Canada has undertaken studies quantifying the economic benefits, but little information regarding the human health benefits particularly in regard to the remediation of contaminated sediment is readily available within the various AOCs. Human health concerns related to *in situ* persistent toxic substances have led to a notable AOC success story regarding the cleanup of contaminated sediment in Waukegan Harbor. This AOC, just north of Chicago, Illinois, is a significant "beacon" for success in regard to the cleanup of polychlorinated biphenyls (PCBs). Dredging to remove PCB contaminated sediment began in 1991 and in February 1997, signs warning of a localized fish advisory due to contaminant sources within the harbor were removed.

Since sediment in many AOCs is significantly contaminated with persistent toxic substances, the benefits of successful restorations, such as in Waukegan Harbor, should be better documented by the implementing agencies. This is especially important regarding human health benefits because cleanup costs for other AOCs might be regarded as excessive by some unless tangible human health benefits are emphasized.

IJC Recommendations Regarding AOC Activities

The following are recommendations from the International Joint Commission regarding issues that must be considered in the planning and implementation of all Area of Concern remediation.

Human Health Considerations

IJC recommends that human health information being developed for LaMPs be incorporated as appropriate into the RAP development process. This information should provide considerable justification for many needed remedial actions in various AOCs and should especially be disseminated within AOCs which have susceptible populations consuming sport-caught fish.

Public-Private Partnerships

The U.S. Environmental Protection Agency and the jurisdictions of Indiana and Ohio cooperatively compile lessons learned from the Ashtabula and Grand Calumet partnerships and disseminate the information to other AOCs. **IJC recommends** that this successful strategy be looked at carefully by both Federal Governments for application in other AOCs.

Funding and Staffing

IJC recommends that the Parties undertake a transparent planning activity aimed at identifying resources available annually for RAP planning and implementation activities as well as resources still required to restore beneficial uses in the 42 AOCs within the Great Lakes basin. *Inter alia,* this information should be used to balance between planning and implementation activities.

IJC recommends that the Parties and jurisdiction determine both the minimal and optimal levels of support necessary to complete planning and implementation of each AOC's restoration activities.

Public Participation

IJC recommends more resources be mobilized by the Parties and jurisdictions in order to enhance public participation efforts. In order to increase public awareness of and participation in AOC restoration efforts, low-cost or no-cost means of reaching and influencing the public should be better utilized.

Information Transfer

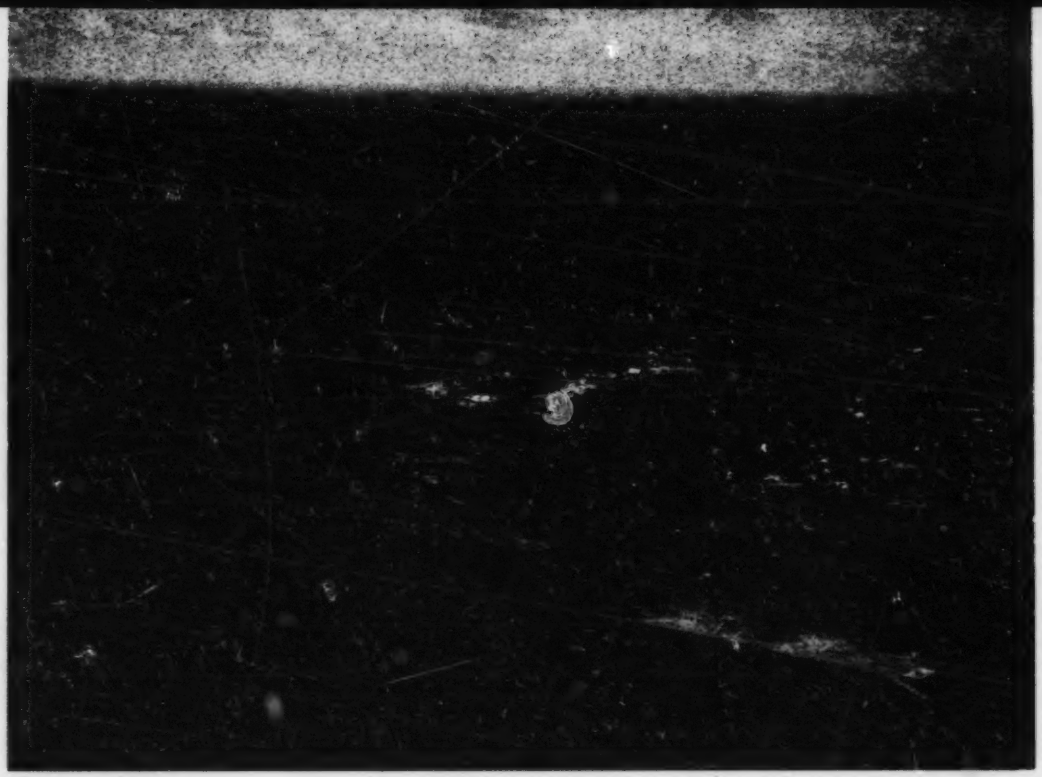
IJC recommends greater use of available technology to enhance public participation efforts and improve the transfer of information and technology to and between AOCs. Efforts similar to the U.S. EPA web site for nonprofit organizations are needed. Increased private sector participation could be instrumental in carrying out this activity. Publishing RAP documents and other publications on web sites would provide a cost-effective means of sharing advances in remediation strategy and technology.

Quantification of Environmental Benefits

The reduction in risk to human health achieved under the Superfund Program in the Waukegan Harbor AOC has not received optimal public exposure. **IJC recommends** additional effort be devoted to properly informing citizens and politicians of this notable success.

PAC Funding

The Muskegon Lake Public Advisory Council example of aggressive fund-raising serves to show that many PACs could be more effective in seeking outside funding. **IJC recommends** that inter-PAC transfer of information concerning funding sources and techniques be promoted.



Manistique, Michigan

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